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earthquakes or glaciers; the other a bold and stimulating guide in every branch of research concerning the evolution of the earth.

B. K. EMERSON.

AMHERST, MASS.

The Students' Laboratory Manual of Physical Geography. By ALBERT PERRY BRIGHAM. New York, Appleton. 1904.

This is an expansion of the 'Teachers' Guide and Laboratory Exercises' published in 1903, and like it designed to accompany Gilbert and Brigham's 'Introduction to Physical Geography,' to which it is very closely adjusted. It is about half as large again as the 'Teachers' Guide,' but omits the lists of books. It is purely for the student and implies the additional use of the guide by the instructor.

Any one using the text referred to will find this an admirable guide for its illustration by map and exercise. It contains many suggestive questions that must help the inexperienced teacher toward modern points of view. This is particularly true of the questions on map reading, which are good and abundant, as they ought to be. For class use they may need some selection apart from selection of exercises, if thorough work by the student himself is to be done. Thus the exercise numbered 13, contoured maps, has material for three one hour exercises with pupils in the 'early stages of the high-school course,' if the reviewer's experience is to be trusted. Drawing a section for the first time, for instance, is no side issue, but quite a task in itself. Alongside this exercise 263b, C. S. Chart No. 3,089 is wonderfully short and easy, though for students well advanced toward the end of their course. The practical exercises are still further from definite form. It would be a hardship to put this book into the hands of the ordinary teacher of the subject, who is almost invariably too crowded for time and too incompetent in the subject matter to rearrange the exercises in practical form, and require her to use it with her classes. No doubt the class would get advantage of it.

It might be supposed that the wide use of laboratory manuals for physics and chemistry

might guide us in some measure in preparing one for physical geography. Many of these are models in their clear statement of what materials to use, what to do with them and how to do it. This definiteness is of great importance. First-year pupils in a high school will find the latitude exercise in this volume, with its generalities, its principle, its geometry and trigonometry, very discouraging.

The description of field exercises for use in unknown localities has generality and vagueness imposed on it by necessity. It is difficult to conceive of satisfactory accounts being written for such work. Professor Brigham has gathered together some excellent suggestions, and that is all that can be done. The variety of the local fields forbids adequate general treatment. The point of view of the work is modern and scientific, as would be expected of its author. Teachers will find it a safe guide to open their eyes and those of their pupils to the real world about them. Altogether we are left still awaiting an adequate laboratory manual for physical geography, but in the present volume is much material that ought to figure in the book when it is written, much material that ought to be in the hands of teachers attempting laboratory work or wishing to know how to do it.

MARK S. W. JEFFERSON.

YPSILANTI, MICH.,

September 19, 1905.

Elements of Applied Microscopy. A Text-book for Beginners. By CHARLES-EDWARD AMORY WINSLOW, Instructor in Industrial Microscopy and Sanitary Biology in the Massachusetts Institute of Technology. Pp. 183, with 60 text figures. New York, John Wiley and Sons. 1905.

This manual is an excellent example of a book prepared for a definite purpose and as the result of experience in an institution where independent work and special ideas have a prominent place.

As the author states in his preface the book does not profess to compete, on the one hand, with monographs or on the other with the popular works on microscopy. It is, however, specifically intended for the class in industrial

microscopy for second year students in chemistry and biology at the Massachusetts Institute of Technology. The object of the course is to give facility in the manipulation of the microscope and an acquaintance with the scope of its practical application.

The first four chapters consider the microscope and its accessories, and the other eight chapters deal with the starches, adulterations of food and drugs, textile fibers, paper, medicine and sanitation, forensic microscopy, microchemistry, petrology and metallurgy.

Each subject is dealt with in a general manner to give the student the principles and the point of view. Exercises are then given to illustrate the methods necessary for the elucidation of the questions which arise in actual practise.

The book is well conceived and satisfactorily worked out. The statements are usually clear and concise. As planned by the author, it is an introduction to the subject, and was designed for use by a teacher possessing knowledge of the more elaborate books, and the monographs bearing upon the various subjects. For the student, excellent references to good sources for further information are given with each chapter so that those especially interested can follow out the subject.

It is not particularly adapted for private learners, as the directions are frequently too brief without the supplementary instruction which naturally goes with a laboratory course. Two directions would prove unsatisfactory in practise: On page 41 the student is told to transfer cover-glasses from the potassium dichromate, sulfuric acid cleaning mixture to fifty per cent. alcohol. *After a thorough rinsing in clean water*, should have been added. On page 28 under the directions for using the Abbe condenser, it is said: 'In general an opening [of the diaphragm] about the size of the front lens of the objective will yield good results.' While this applies to lighting, when no condenser is used it would lead one to light with a less aperture when using an oil immersion objective than when using a low power dry objective. It contravenes the principles given in the preceding chapter. These and a few other slips will be

easily remedied by the teacher and will be naturally righted in a new edition.

It is a source for congratulation that books of this kind are originating from the laboratories of our country, and it is hoped that the number will increase. S. H. G.

The Structure and Development of Mosses and Ferns (Archegoniates). By DOUGLAS HOUGHTON CAMPBELL, Ph.D., Professor of Botany in the Leland Stanford Junior University. New York, The Macmillan Company; London, Macmillan & Co., Ltd. 1905. All rights reserved. Pp. vii + 657. 8vo.

It is but a little more than ten years since the first edition of this book appeared, and now we have a second and considerably revised edition, in which much new matter has been added. By an odd oversight, the fact that this is a second edition is not indicated on the title page, although it is clearly stated in the 'Preface to the Second Edition' with which the volume opens. In this revision, the whole book has been printed from new type, none of the old stereotype plates having been used. This has given the author as much freedom in the preparation of the present book as though it were wholly new, and he has not been obliged to confine his changes to such as could be made to conform to the limitations of the old plates. The result is that this is a new book, and while it resembles the earlier one, and contains much matter which was in that edition, there is scarcely a page or paragraph in which the author has not made some changes of greater or less importance.

The new book follows the same general sequence as the old one, and, on a cursory glance, the reader sees little difference, yet a closer examination shows many changes and additions. The more important changes are those in the treatment of *Marattiales*, *Isoetaceae* and *Lycopodinae*. In the old edition, the *Isoetaceae* were discussed in connection with the *Marattiales*, to which they were regarded as related, but in the new book we find them taken up after the *Lycopodinae*, being regarded as 'sufficiently distinct to warrant the establishment of a separate order, *Isoetales*.'